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# **Immediate Effects of Microsystem Acupuncture in Patients with Oromyofacial Pain and Craniomandibular Disorders (CMD): A Double-Blind Placebo-Controlled Trial**

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Additional information is available at the end of the chapter

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## **1. Introduction**

Patients with craniomandibular disorders (CMD) frequently suffer from pain and dysfunction in the temporomandibular joint (TMJ) and the masticatory muscles, as well as headaches, disorders of the cervical spine, difficulty in opening the mouth, joint clicking [1, 2, 3, 4, 5, 6, 7, 8, 9] sinusitis, chronic neck pain, and reduced mobility of the cervical spine [10, 11]. This variety of pain symptoms is known in dentistry as well as many other medical specialties.

Acupuncture has been acknowledged for more than 200 years as an effective means of achieving pain relief (Traditional Chinese Medicine or TCM) [12]. The fact that not only pain, but also muscular dysfunction and tension, psychosomatic disorders, and dysregulation of the lymphatic and immune systems respond well to acupuncture treatment has been confirmed in numerous scientific studies [13, 14, 15, 16]. Trials using MRI revealed immediate signals in specific regions of the brain [17, 18].

Modern pain research has incidentally disclosed various effects of acupuncture while neurophysiological explanations for these phenomena have also been provided. Targeted needle stimulation at specific points in the skin or mucosa activates the organism's regulatory and modulation abilities. Modulation of pain is achieved in several ways. One of the remarkable results of pain research is the activation of endorphins and neurotransmitters when acupuncture stimuli are applied [19, 20].

In traditional acupuncture, points of analogous reflex relations are found in linear sequence (chains), also known as meridians. In microsystem acupuncture - which is a recently discovered subject - systematic point patterns are found in specific parts of the body such as the auricle, the oral cavity, and others. These microsystems of acupuncture may be described as somatotopies representing a multitude of organs and their respective functions. Microsystem points can only be detected in a state of irritation. Activation of microsystem points results in increased sensitivity and pressure in the microsystem areas (f.i. auricle mouth, skull,....) which is a sign of functional disorders in the corresponding organ.

The stimulation of microsystem points has proved to be a very effective method of acupuncture. For optimum results the microsystem points are preferably detected and pricked by means of the 'very-point' technique [21].

In cases of pain in the stomatognathic system and dysfunction of the TMJ, remote points stimulation on the hands, auricles, at the sternum, and particularly in the enoral retromolar area of the lower jaw were found to be effective in open trials. Pain relief and alleviation of muscular tension was achieved immediately after the application of 'very-point' therapy<sup>21</sup>. Very Point therapy is the most sensitivity point in the point area.

## 2. Statement of the problem

The effects of acupuncture have been reported in many studies, but just a few of these provide data from placebo-controlled trials. We performed a randomized, double-blind placebo-controlled study to investigate the immediate effects of acupuncture in patients with myofascial pain and craniomandibular disorders (CMD).

## 3. Application area and methods

Twenty-three women aged 18 to 64 years, with dysfunction and pain in the stomatognathic system (particularly in the TMJ) and no previous therapy, were recruited for the trial from February 2002 to July 2003. Consecutive patients who reported at the outpatient unit of the department of prosthetic dentistry Medical University Vienna (Prof. Dr. E. Piehslinger) with dysfunction and pain in the stomatognathic system not attributable to any known underlying disease were eligible if they were women between 18 and 65 years of age. (we had no male patients at this time) All patients who were contacted agreed to participate in the study. Patients were randomized on the basis of a computer-generated random permutation list into two groups: one group was treated with acupuncture (n=11) while the other group received sham laser treatment (n=12) [22, 23, 24]. Randomization was performed after consent had been obtained before the date of therapy. The study protocol was approved by the ethics committee of the Medical University of Vienna. The treatment was scheduled to be administered two to seven days after enrolment at the department of dentistry, Medical University of Vienna.

Patients were unaware as to whether they were receiving verum or placebo treatment; this was disclosed after the final assessment. Patients who received placebo treatment were informed after their sham treatment that a different type of treatment might be more effective, and needle acupuncture was offered (because of ethical reasons). All patients in the placebo group consented and were treated with acupuncture after the sham procedure and the actual necessity

The physician who palpated the different muscles and registered the patients' pain scores was blinded to their verum or placebo status. Patients were assessed immediately before and after treatment.

The patients' subjective perception of pain was evaluated on a visual analog scale (VAS).

Muscle palpation included the following muscles and regions: atlanto-occipital region, anterior temporal muscle, medial temporal muscle, posterior temporal muscle, muscles of the cranio-mandibular junction, pterygoid muscles, masseter muscles, digastric muscle, and sternocleidomastoid muscle, on both sides.

Pain on muscle palpation was rated on a four-point scale in ascending intensity from 0 to 3.

Classical acupuncture points according to TCM, microsystem points, and special points that corresponded to the disorders in question were palpated. Table 1 shows the acupuncture points that were positive on palpation and those that were used in therapy.

Acupuncture point	Palpation	Therapy
Upper jaw retromolar	11	9
Lower jaw retromolar	8	4
Upper jaw vestibule	4	1
Lower jaw vestibule	4	0
Large bowel 4	9	1
Small bowel 3, 2	6	7
Auricle	9	9
Sternum	8	5
Adler-Langer points	8	0
Others	5	5

**Table 1.** Acupuncture points positive on palpation and used for acupuncture therapy (n=11).

In microsystem acupuncture, points that demonstrate a high degree of irritation have proved to be more suitable for therapy. These points were given preference. Adler points are paracervical pressure points were used for diagnostic purposes as well as for assessment of therapy.<sup>[25]</sup>

For precise identification of points and subsequent insertion of needles we used the 'very-point' technique. The latter permits acupuncture points to be spotted and pricked with maximum accuracy. Points were detected on the skin in the oral cavity, and very fine and sharp

needles were inserted here. First, the area surrounding the suspected enoral point was palpated manually. As the next step, the region in which the patient reported maximum sensitivity was tapped gently and tangentially with the therapy needle itself, preferably at an angle of about 45°. The point of greatest sensitivity and tenderness, the 'very point', is usually at the center of the region of irritation. The patient reacts accordingly by mimic expression and/or verbal affirmation. (only the verum group received this type of treatment.

Treatment was performed in a double-blind manner; neither the patient nor the person performing the evaluation was aware of the non-functioning laser pen. The sham laser instrument was an inactivated soft laser pen that emitted an ordinary red light. To enhance the credibility of the sham procedure, the emission of red light was accompanied by visual and acoustic signals.

The same point selection criteria were used in both groups. Every point was 'sham irradiated' for about two minutes. The laser pen did not touch the skin but was held at a distance of about 0.5 to 1 cm.

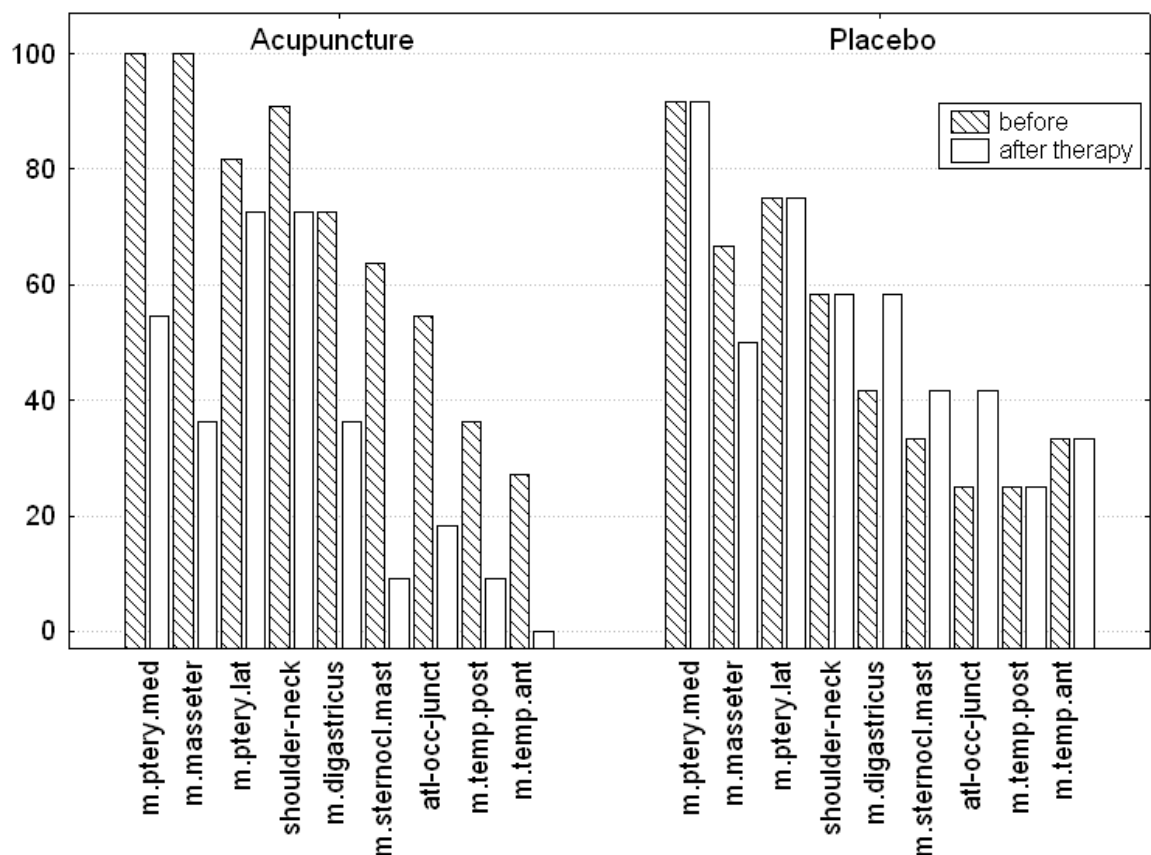
### 3.1. Statistical methods

The sample size was determined on the basis of data obtained from a preliminary open trial. Assuming a difference of one standard deviation with respect to the primary endpoint between groups, an alpha level of 5% and a power goal of 80%, each group was required to consist of 10 patients. The primary endpoint was the patient's subjective assessment of pain on a visual analog scale. Secondary endpoints were the intensities of pain on palpation of various muscles and muscle groups. The latter were summed up to obtain pain ratings for all muscles and muscle groups. Medians and quartile ranges were computed as estimates for central tendency and dispersion. Before/after treatment differences in VAS ratings and the sum score of pain on palpation were compared between groups by Mann-Whitney tests. For the primary endpoint, the alpha error was set to 0.05. Exploratory tests were performed for secondary endpoints, and uncorrected p-values are reported.

## 4. Results

Figure 1 shows results for muscles and muscle groups that were initially painful on palpation in at least 20% of verum or placebo patients. Pain reduction as assessed by palpation was more pronounced in the acupuncture group than in the sham laser group. Of 14 muscles or groups of muscles that were examined, nine were initially scored painful on palpation in 20% or more of patients. Pain on palpation was most commonly observed in the pterygoid and masseter muscles (up to 96% of patients). Acupuncture resulted in greater reduction of pain (average 40%) than placebo treatment (average 8%). A large number of patients had initially experienced pain in the shoulder and neck (91% in the acupuncture group and 58% in the placebo group). In the acupuncture group 64% of patients reported a reduction on the pain scale, while 20% had no pain at all on palpation after the treatment. In contrast, no patient in the placebo group was free of pain after sham

treatment. Fifty percent of acupuncture patients who had initially experienced pain on palpation of the digastric muscle recovered after treatment. In more than 50% of placebo-treated patients, however, pain on palpation of the same muscle persisted after therapy. In the temporal muscles, acupuncture achieved a reduction in nearly all patients while no reduction in pain was observed after placebo treatment. Placebo treatment had no effect on the sternocleidomastoid muscle, whereas 64% of patients with verum acupuncture about 9% reduction in pain. Pain on palpation of the hyoid muscles was rare and resolved after acupuncture in most cases. A summary of pain ratings on palpation is given in Table 2.



**Figure 1.** Percentage of patients in the acupuncture and placebo groups with pain on palpation of various muscles or groups of muscles before and after treatment

	Treatment		p-value*
	before	after	
Acupuncture	22.5 ( 7.8)	8.0 (10.0)	<0.001
Sham	19.0 (15.0)	16.0 (20.0)	

\* Mann-Whitney test for before/after differences

**Table 2.** Median (quartile range) of the sum of pain ratings (0-3) assessed by palpation of 14 muscles.



The results of overall pain ratings on a visual analog scale (VAS) are summarized in Table 3. VAS scores were reduced after acupuncture as well as sham treatment, but the reduction was much more significant after acupuncture ( $p=0.031$ ).

	Treatment		p-value*
	before	after	
Acupuncture	40.5 (34.0)	16.5 (33.0)	0.031
Sham	41.0 (34.0)	30.0 (28.5)	

\* Mann-Whitney test for differences before/after

**Table 3.** Median (quartile range) of visual analog (VAS) ratings of pain.

5. Discussion

In a previous trial comparing a single session of acupuncture with no treatment, a significant improvement in cervical mobility was reported in patients with chronic neck pain. This was in line with data reported by other authors [26, 27, 28]. The present study was designed to test the immediate effects of acupuncture on oromyofacial pain refractory to previous conventional therapy. Our results indicate that acupuncture therapy using remote points – either traditional points or corresponding microsystem points found in a state of irritation – has an immediate effect on motion-related pain as well as pain at rest in patients with CMD, TMJ and cervical spine mobility disorders.

Although the results in the control group indicate a certain placebo effect, it should be noted that these patients were also palpated and palpation and relaxation as such might have reduced pain. Pain in placebo-treated patients was reduced in one muscle (masseter), but increased in three others (digastric and sternocleidomastoid muscles, and atlanto-occipital region).

The absence of local therapy is especially important when patients are sensitive to treatment. Consequently, the frequency of a placebo effect may be higher. Moreover, the study demonstrates the importance of specific point selection performed by finger palpation, needle detection, and subsequent needle insertion at punctual sites of maximum sensitivity in a suspected point area. This ‘very-point’ method can be applied to the skin as well as mucous membranes.

In the mouth, a system of highly effective points is found in the mucous membranes. These points may serve as reflex points in modern pain therapy as well as acupuncture. Points in the mucous membrane, in a state of irritation, are highly sensitive to pressure during palpation. In these cases, reflex therapy of specific points is highly effective. The topography of the points determines the direction of potential therapeutic effects. Immediate relaxation and release of tension in the upper and lower jaw can be achieved especially in the retromolar area. The reflex action from the retromolar area primarily affects the cervical muscles, including the deep muscles of the receptor field of the neck. Although the immediate effects of enoral treatment

do not guarantee a permanent outcome, instant relief from muscular tension and pain is still an important and strong motivating factor for the patient. Once such initial relief and improvement has been achieved, the patient is more receptive to further treatment.

Specific traditional points on the sternum (Renmai), and the cervical Adler-Langer points were used to diagnose conditions as well as monitor the progress of patients.

Local pain points, also known as trigger points, were not treated locally in this study. Treatment was administered via remote points and superior systems in order to refrain from evoking memories of pain and avoid local pain during initial therapy.

One feature of microsystem acupuncture is that specific points serve as points of input for the organism's regulatory systems. Microsystem points are categorized as remote points, distant from the site of pain. This fact is greatly appreciated by patients who experience severe local pain. A very small number of patients did not respond to the treatment used in the study. These patients could be classified as non-responders to treatment via the regulatory system. The vast majority of patients, however, experienced immediate pain relief without the need to touch the affected area, and were therefore motivated to undergo subsequent therapy.

A single acupuncture session may provide immediate pain relief, alleviate muscle tension, enhance mobility, and improve the interplay between the TMJ and the cervical spine. This demonstrates the close interrelationship between the TMJ and the cervical region, craniomandibular dysfunction, and symptoms in the neck and shoulder. Such disorders have become very common and are relevant for a number of medical disciplines, amongst which dentistry plays a key role because occlusion of the teeth, muscles, the TMJ, and the cervical spine constitute a functional unit [29, 30, 31].

## 6. Conclusion

Pain reduction measured on VAS was significantly more pronounced after acupuncture than after placebo treatment ( $p=0.031$ ). The sum of pain scores across 14 muscles was also reduced to a markedly greater extent after acupuncture than after sham laser treatment. Acupuncture may bring immediate pain relief in patients with oromyofacial disorders.

## Author details

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